

RESERVE PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to Elastic Yarns and Fabrics

We, DOW CORNING LIMITED, a British Company, of 146, Leadenhall Street, London, E.C.3, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed (as communicated to us by Dow Corning Corporation, a corporation organised under the laws of the State of Michigan, United States of America, of Midland, Michigan, United States of America), to be particularly described in and by the following statement:—

This invention relates to a filament of vulcanised silicone rubber and to an elastic core yarn or elastic fabric containing such a filament or filaments, and is concerned with an improvement in or modification of the invention of our Specification No. 682,540.

The said Specification No. 682,540 claims an organopoly siloxane composition comprising a benzene-soluble diorganopolysiloxane in which the structural units are R_2SiO where each R is a methyl, phenyl or trimethylsilylmethylene radical, and in which diorganosiloxane at least 90% of the total number of R groups are methyl radicals, said polysiloxane having a penetrometer reading of less than 380 after 10 seconds at 25° C., a silica filler in a proportion of from 20 to 50 parts by weight of filler per 100 parts by weight of polysiloxane, said silica having a pore volume of at least 4 cc. per gram and a heat of wetting of from 0.3 to 1.0 calorie per cc. of pore volume, and from 1.5 to 6 parts by weight per 100 parts by weight of the diorganosiloxane of benzoyl peroxide and/or tertiary butyl perbenzoate as a vulcanising agent.

The said Specification also claims a process for preparing a diorganosiloxane elastomer which comprises heating the above described composition to a temperature above 110° C. until a coherent non-tacky, rubbery product is obtained.

Elastic yarns, elastic fabrics, and garments made therefrom are well known articles of manufacture. In manufacturing such materials, a "core yarn" of natural rubber or of various synthetic organic rubbers is wrapped with cotton, nylon, rayon, wool, silk, or any desired textile yarn. The core yarn may be entirely covered or only partly covered. In either case, the covering yarn is fed at a faster speed than the core yarn through a "twister machine" and thus the covering yarn is made to wrap around the elastic core. There are numerous variations in the technique with which this step is carried out, but these techniques are well known to the textile industry, and it is not intended to limit the present invention to any particular technique in wrapping the elastic core.

The elastic fibres containing natural rubber or synthetic organic rubber core yarns have several inherent disadvantages. The elastic portion of garments made from such materials is often adversely affected by perspiration and body oils with which they must come into contact. Detergents also have a deleterious effect upon such materials.

It is known that contact with the above materials causes the organic rubbers to age or not prematurely. It has also been found that conventional elastic fabrics are adversely affected by modern methods of drying wherein the laundered items are rapidly dried by streams of heated air. Another disadvantage found in the use of organic rubber is in the discolouration of the elastic yarn or fabric during bleaching operations. The rubber in conventional elastic fabrics often develops a red tint when the fabric is subjected to conventional bleaching, and this is objectionable in many garments.

It is an object of the present invention to provide improved elastic fabrics which avoid the above difficulties encountered in the use of conventional elastic yarns.

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It has been found that elastic fabrics containing elastic core yarn in which the elastic core is a vulcanised silicone rubber of the kind hereinafter specified, are not affected by perspiration, body oils, detergents, high temperature drying or bleaching operations. The materials of this invention retain their original elasticity and colour over long periods of time and in spite of being subjected to conditions which are very deleterious to natural rubber or to synthetic organic rubbers.

The silicone rubber core employed in the present invention can be either an extruded filament or in the form of cut strips. The size of the silicone rubber core can vary over a great range, depending upon the type of garment or fabric in which the material is to be used.

Ordinarily the silicone rubber core is used in a size ranging from 0.008 to about 0.02 inches in thickness, the preferred size being from 0.012 to 0.016 inches in thickness.

Not all silicone rubbers are suitable for use in the present invention. The silicone rubber employed must have the high tensile strength and high elongation which to date have only been obtainable by the process of our Specification No. 682,540.

If an extruded type of core rubber is to be used, a composition as described in Specification No. 682,540 is forced through an orifice of the required diameter and the extruded filament is conducted through a heated curing tube or tower of any convenient type. It has been found that a tube of about 30 inches long and heated to 300 to 400° C. is sufficient to cure an elastomeric filament conducted through the tube at a rate of about 30 feet per minute. Longer tubes or slower speeds can, of course, be used at lower temperatures. Similar filaments, however, can be cut by conventional cutting machines from cylinders or flat ribbons of cured silicone rubber prepared as described in Specification No. 682,540.

After preparing the elastic yarn by wrapping a silicone rubber core yarn by conventional methods, the finished elastic yarn is ready for the conventional weaving, knitting, etc. Operations which are used to manufacture an elastic fabric. The material is suitable for use in all applications where an elastic fabric is needed or is desirable such as in the tops of stockings, in the belt portion of various garments such as pyjamas, underwear, and play clothes; in bathing suits; and in various foundation garments such as girdles and corsets.

It is to be understood that various pigments can be incorporated into the

silicone rubber used in the present invention in order to produce the colour desired to harmonise with the fabric in which it is being employed. A typical example of such an additive is titanium dioxide, which can be added to the silicone rubber to make it very white. Other additives can, of course, also be present in order to modify the properties of the silicone rubber. The oxides or carbonates of iron, mercury, cadmium, and zinc are typical of the known additives for silicone rubber which can be present if desired. Metallic zirconates are also sometimes beneficially employed as additives.

The following example, in which the parts by weight, illustrates the invention:—

EXAMPLE

1000 parts of octamethylcyclotetrasiloxane were heated to 165° C. with 0.14 parts of a potassium hydroxide isopropanol complex providing 1 potassium atom per 5000 Si atoms. The mixture was heated and agitated for 25 minutes, then poured into a dish and heated an additional 3 hours at 150° C. When cooled, the polymer was completely soluble in benzene and had a penetrometer reading of 200 in 10 seconds at 25° C. in accordance with the ASTM test method D-217-44T. 100 parts of this polymer were mixed with 35 parts of a silica filler having a pore volume of 5.66 cc. per gram and a heat of wetting of 0.74 calorie per cc. of pore volume, 1.5 parts of benzoyl peroxide, and 15 parts of titanium dioxide. The mixture was extruded through a small orifice so that a filament having a diameter of 0.012 inches was produced. The filament was cured by conducting it at a rate of about 30 feet per minute through a tube which was 30 inches long and heated to a temperature of about 350° C. The cured filament was wrapped with various textile yarns such as cotton, nylon, rayon, and wool to form elastic yarns. Elastic fabrics prepared from these yarns were found to be highly resistant to deterioration from perspiration, detergents, and high temperature drying. Bleaching operations on the silicone elastic fabrics did not cause discolouration of the rubber.

The word "yarn" in the term "elastic core yarn" as used herein is used in the specialised sense employed in the elastic fabric industry. Thus, the "elastic core yarn" is not a "yarn" in the usual sense, meaning a twisted strand of textile fibres, but it means the elastic filament or thread around which conventional textile yarns are wrapped.

What we claim is:—

1. An elastic filament of vulcanised

silicone rubber, said rubber being prepared by the process claimed in Specification No. 682,540.

2. An elastic filament as claimed in
5 Claim 1, wherein the filament is wrapped with a textile yarn, the filament thus forming the elastic core yarn of an elastic yarn.

3. An elastic fabric formed from the elastic filaments claimed in Claim 2.

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